IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant: Christopher M. Fender	Confirmation No.: 6678
Serial No. 10/079,468	Examiner: Whaley, Pablo S.
Filed: February 19, 2002	Group Art Unit: 1631
For: Use Of Infrared Spectroscopy In Genotypic Analysis	Attorney Docket No.: 399483

December 19, 2011

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Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

In accordance with 37 C.F.R. §41.37, and fully responsive to the Office Action dated April 18, 2011, Appellant hereby files the Appeal Brief in support of the Appeal in the above-identified matter (hereinafter the '468 Application). A Notice of Appeal, with the appropriate small entity fee of $270 as required by 37 C.F.R. §§41.31, 41.20(b)(1), was filed on July 18, 2011. The small entity fee of $310 for this appeal brief, as required by 37 C.F.R. §41.20(b)(2), is also filed herewith. This Appeal Brief is being filed within 5 months of the mailing of the Notice of Appeal, and a 3-month extension of time is requested pursuant to 37 C.F.R. §§ 1.136(a) and (b).

(1) Real party in interest.

The real party in interest for this appeal is UNIVERSITY OF MISSOURI BOARD OF CURATORS. Evidence of this assignment, which was recorded on April 7, 2003, may be found at reel/frame 013940/0984.

(2) Related appeals and interferences.

No pending appeals or interferences are currently known to Appellant that will directly affect, be directly affected by, or have a bearing on the decision to be rendered by the Board of Patent Appeals and Interferences in the instant appeal.

(3) Status of claims.

Claims 1-4, 8-13 and 20 are pending and were rejected in the last Office Action dated April 18, 2011 and are at issue in this appeal. Claims 5-7 have been previously cancelled. Claims 14-19 and 21-34 have been previously withdrawn. Claims 1-4, 8-13 and 20 stand rejected as follows:

(a) Claims 1, 2, 4, 8-13 and 20 stand rejected under 35 U.S.C. § 103(a) as being obvious over Yuhara, Res. Bull. Hokkaido National Agriculture Experiment Station, 1975, No. 111, p91-100; Japanese translation document ("Yuhara" hereinafter), in view of Schmitt et al., Crop Science (1992) ("Schmitt" hereinafter), Rutherford, Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p1447-63 ("Rutherford" hereinafter), and Hurburgh et al., WO 00/71993 (2000) ("Hurburgh" hereinafter). Appellant respectfully traverses this rejection and requests withdrawal of the same.

(b) Claims 3 and 9 stand rejected under 35 U.S.C. § 103(a) as being obvious over Yuhara, in view of Schmitt et al., Crop Science (1992) ("Schmitt" hereinafter), Rutherford, Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p1447-63 ("Rutherford" hereinafter), and Hurburgh et al., WO 00/71993 (2000) ("Hurburgh" hereinafter), and further in view of Bewig et al., JAOCS (1994)("Bewig" hereinafter), and Borggaard et al. (Anal. Chem. 1992, 64:545-51) ("Borggaard" hereinafter). Appellant respectfully traverses this rejection and requests withdrawal of the same.

(4) Status of amendments.

The '468 Application was filed on February 19, 2002 as a non-provisional application claiming priority to U.S. provisional application 60/269,474 filed February 16, 2001. A first office action was mailed on June 14, 2004 imposing a Restriction/Election requirement which required Applicant to elect among five Groups of Inventions. A response was filed with amendments to Claims 13, 15-19, and 24-34 on July 14, 2004, electing Group I of Invention with traverse. On October 6, 2004, an office communication was mailed requiring Applicant to correct certain mistakes in the submitted claim amendments. A response was filed on October 20, 2004 and again on October 29, 2004 which corrected those mistakes. A non-final Office Action was mailed

on December 29, 2004 rejecting all pending claims 1-13 and 20. A response was filed on March 29, 2005 with amendments to claims 1, 12 and 20. On June 17, 2005, a non-final office action was mailed rejecting pending claims 1-6, 10-13, and 20, with claims 7-9 being objected to. A response was filed on December 16, 2005, with amendments to claims 1, 12 and 20 and claims 5-7 cancelled. On February 28, 2006, a non-final office action was mailed rejecting all pending claims 1-4, 8-13 and 20. A response was filed on July 25, 2006, with amendments to claims 1, 8 and 20. On October 18, 2006, a final office action was mailed again rejecting all pending claims. An RCE response was filed on February 14, 2007, with amendments to claim 1. On May 1, 2007, a non-final office action was mailed again rejecting all pending claims. Another response was filed on September 4, 2007 with amendments to claims 1 and 4. On November 29, 2007, a non-final office action was mailed again rejecting all pending claims, to which a response was filed on May 6, 2008. On September 4, 2008, a non-final office action was mailed again rejecting all pending claims. Another response was filed on February 4, 2009 with amendments to claims 1, 10 and 11. On July 10, 2009, a non-final office action was mailed again rejecting all pending claims, to which a response was filed on October 7, 2009 with amendments to claim 20. On February 4, 2010, a final office action was mailed again rejecting all pending claims. An RCE response was filed on July 6, 2010, with amendments to claims 1, 12 and 20. On September 28, 2010, a non-final office action was mailed again rejecting all pending claims, to which a response was filed on January 28, 2011 with amendments to claims 1, 12 and 20. A final Office Action was mailed on April 18, 2011, prompting this appeal. A Notice of Appeal was filed on July 18, 2011. Claims 1-4, 8-34 are pending in the application. Claims 14-19 and 21-34 have been previously withdrawn without prejudice. Claims 5-7 have been previously cancelled. Claims 1-4, 8-13 and 20 are under Examination.

(5) Summary of claimed subject matter.

Claims 1-4, and 8-13 are directed to a method for predicting the resistance of a soybean sample to a soybean cyst nematode and claim 20 is directed to a machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode. Claims 1, 12 and 20 are the only independent claims in the application.

Claim 1 recites a method for predicting the resistance of a soybean sample to a soybean cyst nematode, the method comprising (a) obtaining a spectroscopic scan of a soybean sample by using a spectrometer to provide an assay spectra over a predetermined frequency range; (b) comparing the assay spectra with a predictive model based upon spectra obtained over the predetermined frequency range from individual base samples selected from at least the group consisting of known soybean cyst nematode resistant genotypes, known soybean cyst nematode susceptible genotypes, and known genotypes with varying levels of resistance to soybean cyst nematode, wherein the comparison between the assay spectra and the predictive model is conducted by using a discriminate analysis based upon the predictive model, the discriminate analysis including a regression analysis by comparing peak intensity within the predetermined frequency range between the assay spectra and the corresponding spectra; and (c) predicting the soybean cyst nematode resistance of the soybean sample based upon the comparison results between the assay spectra and the predictive model.

Claim 12 recites a method for predicting the resistance of a soybean sample to a soybean cyst nematode, the method comprising (a) measuring near-infrared data of a soybean tissue sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation, (b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed data, and (c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample, wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra, and (d) obtaining a prediction of the soybean cyst nematode resistance of said sample.

Claim 20 recites a machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode, the machine readable code comprising machine readable instructions operable for (a) measuring near-infrared data of a soybean sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation, and said soybean sample is selected from the group consisting of soybean seed, soybean plant tissue, and mixtures thereof, (b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed

data, (c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample, wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra; and (d) obtaining a prediction of the soybean cyst nematode resistance of said sample, wherein said machine readable code is stored on machine readable media.

Referring to the Specification as originally filed, Paragraphs 19-23 on page 5 describe a method of using infrared spectroscopy obtained from a soybean tissue sample for determining resistance to soybean cyst nematode. Paragraph 43 on pages 8-9 discloses the use of mature seeds as a non-destructive analytical means to distinguish SCN resistance from susceptibility. Paragraphs 47-80 (Examples 1 and 2) provide detailed description methods of obtaining a spectroscopic scan of a soybean sample by using a spectrometer to provide an assay spectra over a predetermined frequency range, comparing the assay spectra with a predictive model based upon spectra obtained over the predetermined frequency range from individual base samples selected from at least the group consisting of known soybean cyst nematode resistant genotypes, known soybean cyst nematode susceptible genotypes, and known genotypes with varying levels of resistance to soybean cyst nematode, and predicting the soybean cyst nematode resistance of the soybean sample based upon the comparison results between the assay spectra and the predictive model.

(6) Grounds for rejections to be reviewed on appeal.

(1) Whether Claims 1, 2, 4, 8-13 and 20 are obvious under 35 U.S.C. § 103(a) over Yuhara, Res. Bull. Hokkaido National Agriculture Experiment Station, 1975, No. 111, p91-100; Japanese translation document ("Yuhara" hereinafter), in view of Schmitt et al., Crop Science (1992) ("Schmitt" hereinafter), Rutherford, Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p1447-63 ("Rutherford" hereinafter), and Hurburgh et al., WO 00/71993 (2000) ("Hurburgh" hereinafter).

(2) Whether Claims 3 and 9 are obvious under 35 U.S.C. §103(a) over Yuhara, in view of Schmitt, Rutherford, Hurburgh, and Bewig et al., JAOCS (1994)("Bewig" hereinafter), and Borggaard et al. (Anal. Chem. 1992, 64:545-51) ("Borggaard" hereinafter).

(7) Arguments.

(1) Claims 1, 2, 4, 8-13 and 20

Claims 1, 2, 4, 8-13 and 20 stand rejected under 35 U.S.C. §103(a) as being obvious over Yuhara, Res. Bull. Hokkaido National Agriculture Experiment Station, 1975, No. 111, p91-100; Japanese translation document ("Yuhara" hereinafter), in view of Schmitt et al., Crop Science (1992) ("Schmitt" hereinafter), Rutherford, Journal of Chemical Ecology, 1998, Vol. 24, No. 9, p1447-63 ("Rutherford" hereinafter), and Hurburgh et al., WO 00/71993 (2000) ("Hurburgh" hereinafter). Applicant respectfully disagrees.

Obviousness is a question of law based on underlying factual inquiries. The factual inquiries (also known as the "Graham factual inquiries") to be performed by the Examiner are as follows:

(1) Determining the scope and content of the prior art;

(2) Ascertaining the differences between the claimed invention and the prior art; and

(3) Resolving the level of ordinary skill in the pertinent art.

Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in KSR International Co. v. Teleflex Inc., Federal Register, Vol. 72, No. 195, 57526-35, 57526 (October 10, 2007)("Examination Guidelines" hereinafter). Once the Graham factual inquiries are resolved, the Examiner must determine whether the claimed invention would have been obvious to one of ordinary skill in the art. Although the prior art reference (or references when combined) need not teach or suggest all the claim limitations, the Examiner must explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. *Id.* 57528.

The Supreme Court noted in the *KSR* case that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court stated that "'rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.'" *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727 at

1741, 82 USPQ2d 1385 at 1396 (2007), quoting *In re Kahn*, 441 F.3d 977, 988 (C.A.Fed.2006).

The Guidelines provide, by way of example, a number of rationales that may be used in rejections under obviousness:

(A) Combining prior art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try"—choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

The Guidelines, at 57529.

Appellant respectfully submits that the claimed invention is not obvious over the prior art because significant differences exist between the claimed invention and the prior art and that these differences are such that the claimed invention as a whole would not have been obvious to a person having ordinary skill in the art at the time the invention was made.

The instant application discloses and claims methods for predicting whether or not a soybean plant derived from a soybean sample would be resistant or susceptible to soybean cyst nematode infection by using a spectrometer. Claims 1, 12 and 20 all recite the term "for predicting" and the step of "predicting" or "obtaining prediction." The plain meaning of the term "predict" is to declare or to indicate in advance, or to foretell on the basis of observation, experience, or scientific reason. Merriam-Webster Collegiate Dictionary (2000). The keyword here is "in advance."

While the instant application teaches and claims methods or machine readable codes for telling in advance whether a plant would be resistant to SCN, none of the cited references alone or combined teach or suggest that the method can be used to foretell

whether or not a given soybean sample is resistant to SCN infection. Yuhara teaches a method to detect, not predict infection by SCN. When a soybean sample (or plant) is infected with SCN and the infected sample (or plant) is observed by eye or camera to determine whether it is resistant to SCN infection, such a practice is more appropriately called detection, but not prediction. Although Hurburgh relates to telling apart genetically modified grain from non-genetically modified grain by using NIR spectra, Hurburgh never mentions SCN resistance. Schmitt relates to classification of different responses by soybean to different SCN races. Rutherford discloses a method for predicting sugarcane resistance to certain stalk borers. Taken together, substantial differences exist between the cited references and the instantly claimed invention because none of the cited references, either alone or combined, teach or suggest predicting whether a soybean sample would be resistant to SCN infection.

Under KSR and the Examination Guidelines, the Examiner is required to explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. In other words, the Examiner must explain why using NIR spectra to predict SCN resistance genotypes would have been obvious to one of skill in the art at the time of the instant invention.

Yuhara teaches a method to detect existing plant injury caused by soybean nematode. *See e.g.*, page 91 of the original Yuhara reference, or lines 17-21 on page 2 of the translated document provided by the Examiner. Yuhara teaches using infrared color films that form an image when exposed to infrared light. *See* lines 20-23 on page 3 of the translated document. Yuhara further teaches using different filters to capture multispectral images of the soybean crops at a distance, for example, from an airplane. *See* lines 1-11 on page 4 of the translated document. Yuhara fails to teach or suggest that infrared picture of soybean crops can be used to predict soybean resistance to SCN. To take pictures of a field of plants that have been infected by a pathogen and determine the severity of the infection is a process of assessing the damage, but not predicting whether the plants are resistant to the infection.

As explained above, the term "predict" requires that the determination be made in advance, not after the facts. Yuhara never teaches or suggests taking infrared picture of an uninfected soybean plant and determine whether such a plant would be resistant to

SCN infection if it were inoculated with SCN. Yuhara never shows that SCN resistant soybean plants would look any different from SCN susceptible soybean plants on an infrared picture before the plants have been infected by SCN. Such a result would be required if the infrared photography of Yuhara were to be used to predict SCN susceptibility. On the contrary, the Yuhara methodology is based on the observation that soybean plants that have been infected by SCN appear different from soybean plants that have not been infected. Normally, such a difference can be readily discerned by an experienced farmer during a close-up examination of the plants. The Yuhara method is of value only in that it employed infrared photography to take aerial pictures of the entire field from high above and was able to tell which area of the field has been more severely infected by the pathogen. Taken together, the most important difference between Yuhara and Applicant's methodology is that Yuhara's methodology is only applicable after SCN infection has occurred and may be used in detecting SCN infection, whereas Applicant's claimed invention is useful in predicting SCN susceptibility before any SCN infection has occurred. Put another way, the difference between Yuhara and the instant claims is analogous to one person looking at the sky saying that it is raining versus another person looking at the sky saying that it is going to rain next week.

Although Rutherford discloses a method for predicting sugarcane resistance to certain stalk borers, sugarcane is not soybean, and stalk borer is different from soybean nematode. Just because a method can be used to predict sugarcane resistance to certain stalk borers does not mean that the same method can be applied to predict soybean resistance to SCN. Rutherford never mentions or suggests that its method for predicting sugarcane resistance to stalk borer can be modified to predict soybean resistance to SCN.

Schmitt relates to classification of different responses by soybean to different SCN races but never mentions predicting whether a soybean plant derived from a specific soybean sample would be resistant to SCN. The system of Schmitt is at most a new system for notating (or recording) SCN resistance in soybean. Applicant does not see how such a system contribute directly to how one can predict whether a soybean plant would be resistant to SCN based on NIR scanning.

Although Hurburgh teaches methods for analyzing genetically modified samples and non-genetically modified samples by using NIR. Even if all the calibration

parameters and reference parameters disclosed in Hurburgh are the same as those used in the instant claims, the instantly claimed invention would not have been obvious over Hurburgh alone or in combination with Yuhara, Rutherford and Schmitt.

The gist of the instantly claimed invention is not in setting the calibration parameters and reference parameters and scan soybean samples under those settings. Rather, the most important feature of the instant invention is in the identification of a correlation between NIR spectra and SCN resistance genotypes. The present inventors achieved these feats by obtaining SCN resistance results through bioassays of different soybean samples. The inventors then compare these bioassay results against NIR spectra on the same samples using a number of statistical tools before arriving at the conclusion that NIR spectra can be used to predict SCN susceptibility in a soybean sample. Such a methodology would not work if no correlation existed between the NIR spectra and the SCN susceptibility. Although Hurburgh may have discovered a correlation between NIR spectra and genetic modification of a particular grain, Hurburgh never mentions or contemplates that a correlation between NIR spectra and SCN susceptibility exist in soybean samples.

The Examiner has not provided any reasoning with some rational underpinning as to why one of skill in the art would have jumped from Yuhara, Rutherford, Schmitt or Hurburgh to the instantly claimed method of scanning soybean seeds in order to predict resistance to SCN by the resulting soybean plant. Nor has the Examiner provided any evidence as to why the use of NIR spectra to predict soybean resistance to SCN would have been in the common knowledge available to one of skill in the art at the time of the present invention.

Thus, because the claimed invention is not obvious over Yuhara, in view of Rutherford, Schmitt or Hurburgh, withdrawal of the obviousness rejection is respectfully requested.

(2) Claims 3 and 9

Claims 3 and 9 stand rejected under 35 U.S.C. §103(a) as being obvious over Yuhara, in view of Schmitt, Rutherford, Hurburgh, Bewig et al., JAOCS (1994)("Bewig"

hereinafter), and Borggaard et al. (Anal. Chem. 1992, 64:545-51) ("Borggaard" hereinafter). Applicant respectfully disagrees.

Claims 3 and 9 both depend from Claim 1 directly or indirectly and necessarily incorporate all the limitations of Claim 1. As set forth above, the invention of Claim 1 is not obvious over Yuhara, in view of Schmitt, Rutherford, and Hurburgh because the recitation of predicting SCN resistance is not disclosed or suggested by any of the cited references and would not have been obvious to one of skill in the art at the time of the instant invention. Bewig relates to the use of soybean seed oil in a discriminate analysis, and Borggaard relates to the use of neural networks for interpreting NIR spectra for the purpose of classifying samples. Nothing in either Bewig or Borggaard is relevant to predicting soybean resistance to SCN. Therefore, Bewig and Borggaard do not cure the defect in the other references as explained in Section II. Because the inventions of claim 3 and claim 9 are not obvious over the cited references, withdrawal of the obviousness rejections is respectfully requested.

The following commentary is provided with respect to the individual claims:

Claim 1

Claim 1 recites a method for predicting the resistance of a soybean sample to a soybean cyst nematode.

1. A method for predicting the resistance of a soybean sample to a soybean cyst nematode, said method comprising the steps of:

(a) obtaining a spectroscopic scan of a soybean sample by using a spectrometer to provide an assay spectra over a predetermined frequency range;

(b) comparing the assay spectra with a predictive model based upon spectra obtained over the predetermined frequency range from individual base samples selected from at least the group consisting of known soybean cyst nematode resistant genotypes, known soybean cyst nematode susceptible genotypes, and known genotypes with varying levels of resistance to soybean cyst nematode,

said comparison between the assay spectra and the predictive model being conducted by using a discriminate analysis based upon the predictive model, wherein the discriminate analysis includes a regression analysis by comparing peak intensity within the predetermined frequency range between the assay spectra and the corresponding spectra; and

(c) predicting the soybean cyst nematode resistance of the soybean sample based upon the comparison results between the assay spectra and the predictive model.

In regard to Claim 1, the combined references of Yuhara, Rutherford, Schmitt and Hurburgh do not teach or suggest a spectroscopic scan of a soybean sample over a predetermined frequency range may be used to predict SCN resistance of a soybean plant derived from the soybean sample.

Claims 2-4, and 8-11 depend from Claim 1 and benefit from like arguments as provided hereinabove. However, these Claims have additional features that patentably distinguish them over the reference.

Claim 12 recites a method for predicting the resistance of a soybean sample to a soybean cyst nematode using NIR scanning.

12. A method for predicting the resistance of a soybean sample to a soybean cyst nematode, said method comprising:

(a) measuring near-infrared data of a soybean tissue sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation,

(b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed data,

(c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample,

wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra, and

(d) obtaining a prediction of the soybean cyst nematode resistance of said sample.

In regard to Claim 12, the combined references of Yuhara, Rutherford, Schmitt and Hurburgh do not teach or suggest a spectroscopic scan of a soybean sample under NIR may be used to predict SCN resistance of a soybean plant derived from the soybean sample.

Claim 13 depends from Claim 12 and benefit from like arguments as provided hereinabove. However, Claim 13 has additional features that patentably distinguish them over the reference.

Claim 20 recites a machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode.

20. A machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode, said machine readable code comprising machine readable instructions operable for:

(a) measuring near-infrared data of a soybean sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation, and said soybean sample is selected from the group consisting of soybean seed, soybean plant tissue, and mixtures thereof;

(b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed data;

(c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample,

wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra; and

(d) obtaining a prediction of the soybean cyst nematode resistance of said sample, wherein said machine readable code is stored on machine readable media.

In regard to Claim 20, the combined references of Yuhara, Rutherford, Schmitt and Hurburgh do not teach or suggest the machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode.

(8) Claims appendix.

A copy of Claims 1-4, 8-34 involved in this appeal is enclosed as an appendix hereto.

(9) Evidence appendix.

Not applicable.

(10) Related proceedings appendix.

Not applicable.

CONCLUSION

Appellant respectfully requests the Honorable Board of Appeals reverse the Examiner in the rejections of Claims 1-4, 8-13 and 20 under 35 U.S.C. § 103(a). Appellant respectfully solicits allowance of Claims 1-4, 8-13 and 20.

Other than the costs for this appeal brief, no further fees are deemed due in connection with this matter. However, the Commissioner is hereby authorized to charge any fees which may be due in this matter from Deposit Account Number 12-0600.

Respectfully submitted,

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Claims Appendix

1. A method for predicting the resistance of a soybean sample to a soybean cyst nematode, said method comprising the steps of:

(a) obtaining a spectroscopic scan of a soybean sample by using a spectrometer to provide an assay spectra over a predetermined frequency range;

(b) comparing the assay spectra with a predictive model based upon spectra obtained over the predetermined frequency range from individual base samples selected from at least the group consisting of known soybean cyst nematode resistant genotypes, known soybean cyst nematode susceptible genotypes, and known genotypes with varying levels of resistance to soybean cyst nematode,

said comparison between the assay spectra and the predictive model being conducted by using a discriminate analysis based upon the predictive model, wherein the discriminate analysis includes a regression analysis by comparing peak intensity within the predetermined frequency range between the assay spectra and the corresponding spectra; and

(c) predicting the soybean cyst nematode resistance of the soybean sample based upon the comparison results between the assay spectra and the predictive model.

2. The method of Claim 1 wherein said soybean sample is selected from the group consisting of leaf, stem, and seed.

3. The method of Claim 2 wherein said soybean sample is seed.

4. The method of Claim 1 further comprising a step wherein the assay spectra and the predictive model are visually compared.

5-7 (Cancelled).

8. The method of Claim 1 wherein the predictive model used in the comparing step (b) comprises an intelligent algorithm.

9. The method of Claim 8 wherein the natural intelligent algorithm is selected from the group consisting of an adaptive filter, a neural network, and combinations thereof.

10. The method of Claim 1 wherein the predetermined frequency range comprises near-infrared.

11. The method of Claim 1 wherein the predetermined frequency range is near-infrared.

12. A method for predicting the resistance of a soybean sample to a soybean cyst nematode, said method comprising:

(a) measuring near-infrared data of a soybean tissue sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation,

(b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed data,

(c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample,

wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra., and

(d) obtaining a prediction of the soybean cyst nematode resistance of said sample.

13. The method of Claim 12 wherein said sample is selected from the group consisting of soybean leaf, stem, and seed.

14. (Withdrawn) An electronically programmable apparatus for predicting the soybean cyst nematode resistance of soybean genotypes comprising:

(a) a spectrophotometer configured to measure spectrographic data from a soybean tissue sample;

(b) a predictive model for the soybean cyst nematode resistance of the sample;

(c) program instructions for processing the spectrographic data by mathematical transformation to obtain mathematically transformed data acceptable for use in the predictive model; and

(d) means for using the mathematically transformed data to obtain a prediction of the soybean cyst nematode resistance of the sample.

15. (Withdrawn) The electronically programmable apparatus of Claim 14 wherein the spectrographic data is near-infrared data.

16. (Withdrawn) The electronically programmable apparatus of Claim 15 wherein said near-infrared data is absorption data.

17. (Withdrawn) The electronically programmable apparatus of Claim 14 wherein the near-infrared data is reflectance data.

18. (Withdrawn-currently amended) The electronically programmable apparatus of Claim 14 wherein the predictive model is a discriminant discriminate analysis.

19. (Withdrawn) The electronically programmable apparatus of Claim 14 wherein the predictive model is a natural intelligent algorithm.

20. A machine readable code for use in predicting the resistance of a soybean sample to a soybean cyst nematode, said machine readable code comprising machine readable instructions operable for:

(a) measuring near-infrared data of a soybean sample using a near infrared (NIR) spectrometer to scan over the near infrared range of radiation, and said soybean sample is selected from the group consisting of soybean seed, soybean plant tissue, and mixtures thereof;

(b) transforming the near-infrared data measured in (a) by mathematical transformation to obtain mathematically transformed data;

(c) inputting the transformed data into a predictive model for the soybean cyst nematode resistance of said sample,

wherein the predictive model includes a discriminate analysis based upon a regression analysis for comparing peak intensity within the NIR range between the assay spectra and the corresponding spectra; and

(d) obtaining a prediction of the soybean cyst nematode resistance of said sample,

wherein said machine readable code is stored on machine readable media.

21. (Withdrawn) Soybean seed generated from a breeding program using the method of Claim 1.

22. (Withdrawn) Soybean seed generated from a breeding program using the method of Claim 12.

23. (Withdrawn) A method for comparing genotypes of biological samples comprising:

(a) obtaining a spectroscopic scan of a tissue sample to provide an assay spectra over a predetermined frequency range; and

(b) comparing the assay spectra with a predictive model based upon corresponding spectra obtained over the predetermined frequency range from at least one control sample to provide comparison results.

24. (Withdrawn) The method of Claim 23 wherein said sample is selected from the group consisting of plant, animal, bacterial, fungal, and viral samples.

25. (Withdrawn) The method of Claim 24 wherein said sample is plant.

26. (Withdrawn) The method of Claim 24 wherein said sample is animal.

27. (Withdrawn) The method of Claim 24 wherein said sample is bacterial.

28. (Withdrawn) The method of Claim 24 wherein said sample is fungal.

29. (Withdrawn) The method of Claim 24 wherein said sample is viral.

30. (Withdrawn) The method of Claim 25 wherein said plant is soybean.

31. (Withdrawn) The method of Claim 23 wherein said spectroscopic scan is an infrared spectroscopic scan.

32. (Withdrawn) The method of Claim 23 wherein said genotype is soybean cyst nematode resistance.

33. (Withdrawn) A plant breeding program based on results obtained from the method of Claim 23.

34. (Withdrawn) Seeds generated from the method of Claim 29.

Evidence appendix

Not applicable.

Related Proceedings Appendix

Not applicable.